

LISTING OF CLAIMS

This listing of claims replaces all prior versions and listings of claims in this application.

1 1. (Currently Amended) A display device that reduces energy consumption during
2 row transitions comprising:

3 a plurality of pixels arranged in an array having n rows and m columns, each
4 of said pixels comprising ~~[[:]]~~ a switching element having a gate, ~~and a capacitor~~
5 ~~coupled to said switching element;~~

6 a plurality of control lines, each connected to the gates of a corresponding row
7 of said pixels; and

8 a plurality of data lines, each connected to the switching elements of a
9 corresponding column of that select said pixels;

10 a row driver circuit that scans ~~activates each pixel in the n rows by a~~
11 draining one of said control lines down to a given reference voltage, storing the
12 drained charge as a stored charge, and charging another of said control lines to a
13 given scan voltage using the stored charge, ~~a means of a row voltage applied to said~~
14 ~~gate of said switching element; and~~

15 a column driver circuit that controls the m columns by applying with a
16 column voltage to said data lines, said column voltage corresponding to the image
17 data of the pixels of a selected row to be displayed,

18 wherein[[,]] the row driver circuit is arranged to drain said control lines by an
19 intermediate draining of a charge from a selected one of the control lines down to an
20 intermediate voltage level and storing the drained charge, followed by a final
21 draining down of a remaining charge from the selected one of the control lines, said
22 final draining including connecting of the selected one line to a common reference
23 voltage, said final draining ending at a time T relative to said intermediate
24 draining, and

25 wherein said row driver circuit is arranged to perform said charging by an
26 intermediate charging, beginning at a time not substantially earlier than T, of said
27 another selected one of the control lines to said intermediate voltage level, said
28 intermediate charging using said stored charge, followed by a final charging of said
29 another selected one of the control lines to said scan voltage during a transition
30 from a selected row n to another row n + x, said capacitor is charged with an
31 intermediate voltage level during discharging of row n and row n + x is charged
32 with said intermediate voltage level by said capacitor after the row voltage of row n
33 is fully discharged and the row n+x is first connected to said intermediate voltage
34 level and subsequently is charged up to the required row voltage wherein the charge
35 of the selected row n can be stored in a capacitor at the intermediate voltage level.

1 2. (Currently Amended) The [[A]] display device of as ~~claimed in~~ claim 1,

2 wherein the row driver is arranged to perform the intermediate draining as a
3 staged intermediate draining, comprising a first intermediate draining of a charge

4 from the selected one of the control lines down to a first intermediate voltage level,
5 and a storing of the drained charge as a first stored charge, followed by second
6 intermediate draining of a charge from the selected one of the control lines down to
7 a second intermediate voltage level, and a storing of the drained charge as a second
8 stored charge, and

9 wherein the row driver is arranged to perform the intermediate charging as
10 a successive intermediate charging, comprising a first intermediate charging of the
11 selected another of the control lines using the first stored charge, followed by a
12 second intermediate charging of the selected another of the control lines using the
13 second stored charge

14 ~~characterized in that a plurality of intermediate voltage levels are provided for~~
15 ~~charge sharing, and the selected row n can be coupled in steps to a first~~
16 ~~intermediate voltage level and subsequently to further intermediate voltage levels~~
17 ~~up to a final intermediate voltage level for the purpose of charge sharing.~~

3. (Canceled).

1 4. (Currently Amended) The [[A]] display device of as claimed in claim 1,
2 wherein the column voltage ranges up to a maximum column voltage and said
3 maximum column voltage is used as the intermediate voltage level.

1 5. (Currently Amended) The [[A]] display device of ~~as claimed~~ in claim 1,
2 wherein ~~a voltage corresponding to~~ the intermediate voltage level is half of said
3 scan ~~the applied row~~ voltage.

6. (Canceled).

1 7. (Currently Amended) A method reducing energy consumption during row
2 transitions in a display device with pixels arranged in rows n and columns m, each
3 pixel comprising a capacitor coupled to a switching element, said method
4 comprising the following steps:

5 draining one of said control lines down to a given reference voltage, and
6 storing the drained charge as a stored charge;

7 charging another of said control lines to a given scan voltage using the stored
8 charge,

9 wherein the draining comprises

10 an intermediate draining of a charge from a selected one of the control
11 lines down to an intermediate voltage level,

12 storing the drained charge, and

13 a final draining down to a common reference voltage of a remaining
14 charge from the selected one of the control lines, said final draining ending at
15 a time T relative to said intermediate draining and

16 wherein the charging comprises

17 an intermediate charging to said intermediate voltage level of another
18 selected one of the control lines, said charging using said stored charge and
19 beginning at a time not substantially earlier than T, and

20 a final charging to said scan voltage of said another selected one of the
21 control lines

22 ~~supplying row voltages to the rows via control lines to select said rows;~~

23 ~~supplying column voltages to the columns m via data lines;~~

24 ~~during a transition from a selected row n to another row n + k,~~

25 ~~charging said capacitor to an intermediate voltage level during~~

26 ~~discharging of selected row n;~~

27 ~~charging row n + x to said intermediate voltage level with said~~
28 ~~capacitor after the row voltage of row n is fully discharged , and wherein the rows~~
29 ~~are consecutively selected, and in the case of a transition from a selected row n to~~
30 ~~another row n+1 the charge applied to the selected row n is transferred to an~~
31 ~~intermediate voltage level, and the other row n+1 is first connected to said~~
32 ~~intermediate voltage level and is subsequently charged up to the required control~~
33 ~~voltage, wherein the charge of the selected row n can be stored in a capacitor at the~~
34 ~~intermediate voltage level.~~